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DIVISION OF ZOOLOGY.

THE ZOOLOGICAL QUARTERLY BULLETIN.

VOL. III. No. I.

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THE ECONOMIC VALUE

OF

OUR NATIVE BIRDS.

DISCUSSED BY ORDERS AND FAMILIES.

ORDER XIII. MACROCHIRES. GOATSUCKERS, SWIFTS, HUMMING-BIRDS, ETC.
FAMILY 20. CAPRIMULGIDÆ NIGHTHAWKS, WHIPPOORWILLS, ETC.
FAMILY 21. MICROPODIDÆ, THE SWIFTS.
FAMILY 22. TROCHILIDÆ, THE HUMMING-BIRDS.

Issued Quarterly from the Department of Agriculture, OFFICE OF THE ECONOMIC ZOOLOGIST, Harrisburg, Pa.

BY H. A. SURFACE, M. S., ECONOMIC ZOOLOGIST.

May 15, 1905.

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EXPLANATION.

The publications of this office are of four kinds: (1) The Monthly Bulletins devoted mostly to Insects and other Plant Diseases; (2) the Zoological Quarterly Bulletins devoted to Vertebrate Animals, and at present treating the subject of Birds; (3) Special Bulletins upon such subjects as have demanded our special investigation, and (4) the Annual Reports, giving a summary of the work of the Division of Zoology for the fiscal year.

These publications are sent free to all persons who request them, and the periodicals (Nos. 1 and 2) are sent regularly to all names and addresses upon our mailing list. The Special Bulletins (No. 3) and the Annual Reports (No. 4) are sent only upon request for each respective issue. Announcements of the publications of this office and of the specimens we desire for the work we are doing are occasionally made in the Monthly Bulletins, which are our chief means of coming into close touch with readers.

The work of this office has been so pressing, and growing to such an extent, that it has not been possible to issue the Quarterly Bulletins as promptly as we have desired, but with a greatly increased force we hope to be able to overcome this difficulty by the next issue.

As the value of our investigations depends to a great extent upon the co-operation given by the citizens in various parts of the State, we request all persons who can do so to send us specimens of insects and reptiles for our studies of these creatures in Pennsylvania, and also specimens of such birds, or at least the bird-stomachs with their contents, as they may be able to procure by legal means. Birds are often found dead, and we shall be glad to receive these to make a study of the causes of their death, as well as their food and such other features as will be of value to scientists and other persons. Large specimens may be sent by express, at our expense, and small specimens may be sent by mail, and postage will be refunded. In all cases it is very important that specimens should be so packed in firm boxes or cans that they will not be crushed in transit. As we have no way of keeping specimens alive, and as we especially wish to study their stomach contents, it is quite desirable that they should be killed as soon as they are collected or before shipping. We do not have funds for purchasing specimens at the present time, but shall reciprocate all favors whenever possible. Address all packages and communications to Prof. H. A. Surface, Economic Zoologist, Harrisburg, Pa.

ORDER XIII. MACROCHIRES OR "LARGE-WINGED BIRDS."

The birds of this Order are characterized by having the mouth either extremely wide (Fissirostral), or the bill very long and attenuated (Tenuirostral). The wings are very long and pointed and the primary or outer and stronger feathers are elongate. The feet are unusually small and weak, and have three toes in front and one behind, with the hinder toe small and somewhat elevated. There are but ten tail feathers, and this with other characteristics distinguish the birds of this Order from those belonging to the next Order to be discussed, which is that of Passeres or "Perching Birds," and which is the last and also by far the largest Order of the birds of America. The name Macrochires comes from the Greek, *Makros*, long, and *keir*, a hand, referring to the long wings possessed by the birds of this Order. There are three Families of the Order Macrochires, and these are to be separated by the following Analytic Key, which is taken from Jordan's "Manual of Vertebrates:"

a. Bill small and wide, or fissirostral, swallow-like; secondaries more than 6.

b. Middle toe much longer than lateral toes, its claw pectinate; angle of mouth or rictus with bristles; plumage very soft. Fam. 20. Carprimugidæ. (See page 4.)

bb. Middle toe scarcely longer than lateral toes, its claw not pectinate; no rictal bristles; plumage compact. Fam. 21. Micropodidæ. (See page 22.)

aa. Bill very long and slender, or tenuirostral; secondaries 6; plumage compact, with metallic lustre. Fam. 22. Trichilidæ. (See page 27.)

Family 20. **Caprimulgidæ**, or "The Night Hawks" and "Whip-poor-wills."

The birds of this Family have been popularly but very wrongly called "Goatsuckers," and the scientific name of the Family comes from the Latin, *capra*, goat, and *mulgeo*, to suck, from an old tradition that these birds were accustomed to milk goats at night. While this is a relic of the dark days of superstition, the name still clings to the birds of this Family.

All the species of this Family have the bill very short and very wide, making a mouth with an immense fissure, and consequently called "fissirostral." The gap of the mouth reaches below the eyes, and it can be opened to incredible width. Inside it is lined with glutinous or sticky saliva, which traps insects coming against it, and its catching capacity is also increased in nearly all species by the addition of very long rictal bristles or strong hairs at the sides of the mouth. The purpose of these bristles is to entangle and thus trap insects, as the birds fly through the air at night feeding as they fly. In connection with this living trap, the birds of this Family are provided with a comb on the inside of the middle claw of each foot. This is used to comb the insects from the bristles into the mouth, and the owners are able to do this with great dexterity.

As with all night-flying birds, the plumage of these is long, loose and fluffy, and of a very sombre or inconspicuous color, and the species of this Family also agree with the general Order of Macrochires, having wings long and pointed and tail feathers, ten in number. The feet are so small that when perching they rest lengthwise upon the limbs and logs, instead of crosswise, as they do not appear to be able to grasp the branches as do true "Perching Birds." We have, however, seen exceptions to the statement frequently met "that these birds never perch crosswise on the limbs." (See discussion of Night Hawk below.)

These birds are almost entirely insectivorous, feeding upon larger insects that fly by dusk and at night, and taking most of their food while flying, although they occasionally rest upon the ground, picking up insects that are nocturnal in their habits. During cloudy days they often fly and feed, and have even been known to utter their calls at such times. They should strictly be called crepuscular or feeding by twilight, as they become active toward evening, and fly, feed and call, and generally become quiet sometime before midnight, and commence their activity again shortly before dawn.

There is no reason why the word "Hawk" should be used in connection with them, as they do not have the appearance of a hawk, nor do they take the same food. They are wholly beneficial in their feeding habits, as is to be seen by the detailed discussion of the three species named below.

There are at least one hundred species of these birds known, only two of which are at all common in Pennsylvania, and a third which is abundant in the Southern States is occasionally found in the southeastern and southwestern corners of this Commonwealth. The three species are to be separated by the following Analytic Key:

(a.) Rictal or mouth bristles very long; tail rounded; tarsus largely feathered.

b. Rictal bristles branched or forked.
Antrostomus carolinensis, or Chuckwill'sWidow.

bb. Rictal bristles simple, not branched.
A. vociferous, or Whippoorwill.

(aa.) Rictal bristles very minute or absent; tail notched in the middle, not rounded.
Chordeiles Virginianus, or Night Hawk. Bull Bat.

A. O. U. No. 416. CHUCKWILL'S WIDOW OR "DUTCH WHIP-POORWILL."

Antrostomus carolinensis (Gmelin.)

The Chuckwill's Widow is found from the Gulf to Virginia, and occasionally further northward, accidentally as far north as Massachusetts. Its western range extends into the Mississippi Valley southward. It is the largest member of its Family found in this part of the world, and can be known by its large size, being a foot long, or two inches longer than the Whippoorwill, and also by its reddish color, as well as by the characteristic side branches on the bristles at the corners of the mouth. It is the only one of this Family found in this region that has the branched rictal bristles.

While it is very rare in Pennsylvania it occasonally occurs in the south-eastern and south-western corners of this Commonwealth. It is known in the Southern States as "Chuckwill's Widow" and "Dutch Whippoorwill," and in the West Indies as the "Spanish Whippoorwill." These common names are given from the note or call which they give, and which contains one more syllable than the call of the Whippoorwill. These birds winter south of the United States, entering this country in April and remaining until September. They are nocturnal in their habits, migrating as well as feeding in the evening or at night or in early morning. What Major Bendire has written of this very uncommon species in Pennsylvania applies almost equally to our other two species which are much more common.

"Chuck-will's-widow" is the largest of the Caprimulgidæ found in the United States, and, like the rest of the members of this family, it is crepuscular and nocturnal in its habits, being rarely seen on the wing in the daytime, unless accidentally startled from its hiding place. It spends its days mostly hidden away in dark, shady places

in woods, among the undergrowth, especially along rocky hillsides, resting either on the ground or in some hollow log, under a ledge of rock, or perched lengthwise on some low limb of a bushy, densely foliaged tree. Although a tolerably common bird throughout the more southern portions of its range, it is by no means as well known generally as it might be, and only a careful and patient observer can expect to become familiar with its general habits. Its flight is extremely noiseless, the very embodiment of grace and agility combined, and in this respect it resembles our Owls somewhat, now skimming along close to the ground, dropping down suddenly to pick up some beetle, then dashing upward again, perhaps after a moth; constantly twisting and turning from one course to another, but always on the lookout for any passing insect. As soon as the sun has disappeared behind the horizon, all the Chuck-will's-widows in the neighborhood become alert at once, leaving their customary resting places in search of food, and during the mating season especially, commence to utter the peculiar call, "chuck-will's widow," from which they have derived their name. This strangely doleful-sounding note is occasionally, particularly while under sexual excitement, uttered very rapidly for two or three minutes or more, the syllables being rolled into one, until the bird is compelled to take a rest from sheer want of breath."

It is generally supposed that when this bird is molested at its nest it carries its young or eggs to a safe place in its very large mouth, but careful observers have tried to force it to this performance and watch the methods of procedure, and have never been able to succeed while making this attempt, and it is doubtless true that the bird does not generally use its mouth in carrying eggs or young. Bendire, in his Life History of North American Birds, says:

"The food of Chuck-will's widow consists mainly of beetles, winged ants, and other insects, especially the night-flying Lepidoptera—such as the Sphingidæ (Hawk moths), Saturnoidæ (silk moths), and Noctuidæ (Owl moths)—and the enormous width of its short bill enables it to swallow the largest of these very readily. It does occasionally aspire to larger game, and it seems to be a well-established fact that small birds form a portion of its regular bill of fare."

Of the Chuck-will's-widow or Carolina Goatsucker Studer has written: "Its flight is low, and it skims only a few feet above the surface of the ground, frequently settling on logs and fences, from whence it often sweeps around in pursuit of flying moths and insects which constitute its food. Sometimes they are seen sailing near the ground, and occasionally descend to pick up a beetle or flutter lightly around the trunk of the tree in quest of some insect crawling upon the bark."

This bird has such a very large mouth that it not only eats the largest of our nocturnal insects, but has also been known to swallow other birds. One has been found with an entire Swamp Sparrow in its stomach, and another was found that had swallowed a Humming bird, while Audubon relates having frequently found the remains of birds in their stomachs. The interesting and practical features of its feeding habits is that it takes the very large night-flying moths which escape the attacks of most birds excepting those of this Family.

A. O. U. NO. 417. THE WHIPPOORWILL.

Antrostomus vociferus (Wilson.) (Plate I.)

The Whippoorwill is a bird that is very common in some portions of this State, and quite rare in others. It is not frequently seen because it prefers to remain during the daytime in dark or secluded woodland, or among bushes, but its call is quite familiar to most persons who have spent a night or more in camp in the wooded hills or mountains or along streams.

It is known by its soft feathers, short bill, wide mouth with unbranched bristles at the angles, rounded tail, and light bar on breast and end of outer tail feathers, and the absence of white spots on the wings. This is one of the birds that is much more often heard than seen, and when flying is often confused with the Night Hawk or Bull Bat, but can easily be distinguished by the white spots in each of the wings of the latter. The male and female Whip-poor-will are colored alike, excepting that where the male has white on the outer tail feathers and a white band on the throat, the female has cream or buff-colored spots. The upper parts are streaked with black, the head is finely mottled with black and white, the back is mottled with yellowish buff and black, the primaries are black with broken reddish bars; the tail is irregularly barred with black and mottled with cream or yellowish buff; a narrow white band occurs upon the upper part of the breast, and the long black stiff, unbranched bristles at the base of the bill are quite conspicuous. This bird is about ten inches long; with a wing measuring six inches from the outer joints to the tips of the primaries, and expanding from sixteen to eighteen inches, and a tail about five inches in length.

The Whip-poor-will, like the other species of the Caprimulgidæ found in the United States, makes no nest, but deposits its eggs usually on a layer of dry leaves of deciduous trees, sometimes on dry pine needles, and occasionally on the bare ground, generally under thick bushes which afford plenty of shade, in some secluded and out-of -the-way corner, near the outskirts of the forests, or on

brush-covered hill-sides, river bluffs, etc., which are not readily accessible and not disturbed much. It is naturally a timid and retiring bird, and does not brook repeated intrusion very gracefully. The nesting site selected is always a well-drained and dry one; light and sandy soils are preferred to the heavier ones, and it rarely, if ever, nests in places that are subject to overflow.

The number of eggs to a set is two; these are deposited on alternate days, and incubation commences with the first egg laid. I believe the female attends to its duty almost exclusively, and she is a most devoted parent, using all the well-known artifices of many ground-building species to entice the intruder away from her treasure. Occasionally she will remove her eggs if the nesting site has been disturbed, and the eggs is said to be carried away in her capacious mouth; but this is not a regular habit by any means. The callow young, however, are more frequently carried to a safe locality if too often disturebd. The eggs of the Whip-poor-will are large for the size of the bird, and elliptical oval in shape; the shell is rather frail, close-grained, and somewhat variable in the amount of luster present; some are rather glossy, while others show little or no gloss. They are grayish white, spotted with varying shades of lilac, and are so nearly the color of the background upon which they are laid, that it is almost impossible to discover their presence, even though one should walk directly over the spot where they are exposed, as they are concealed by their protective coloration.

The Whip-poor-will's arrive with us in April or May and depart in September. This year we recorded them for the first time on May 2nd. It is found from Nova Scotia southward, and breeds in most of its range. Of this species Captain Bendire says:

"Like many other species, it is very much attached to its once chosen haunts, and will return to them from year to year, often nesting in the identical spot, or at most within a few feet of it, if the immediate surroundings have not been changed too much in the meantime. It returns south again during the first part of October. Its favorite resorts are dense, shady thickets, bordering on clearings and river valleys; rocky and brush-covered hillsides, and rolling country, interspersed alternately with woods and cultivated tracts, are preferred to the more level prairie regions. In the latter it is only found along the river bluffs, among the shrubbery, and rarely any distance away on the open and nearly treeless plains, unless at dusk and in early hours of the night, while in search of food on the roads leading through these. Its flight is strong, swift, graceful, and entirely noiseless, gliding like a shadow close along the ground in pursuit of night-prowling insects, mainly Lepidoptera and Coleoptera, on which it feeds almost exclusively.

In Western States, which are sometimes overrun by swarms of Rocky Mountain Locusts, it also feeds largely on these when abundant. Considered from an economic point of view, the Whip-poor-will is an eminently useful and beneficial bird, deserving the fullest protection. Like Chuck-will's-widow, it is crepuscular and nocturnal in its habits, and is rarely seen in the daytime unless accidentally driven from its hiding place. It passes the hours of daylight in shady retreats, either on the ground or on low limbs of trees (on which it also perches lengthwise), on old logs and on or under rocks well covered by underbrush. It is rarely found at higher altitudes than 3,500 feet. The familiar call note of the Whip-poor-will is well expressed by its name, but it sounds to me more like "Whip-poor-wick," especially when uttered close to the listener. On their first arrival on the breeding grounds this call is especially frequently and rapidly repeated at the beginning of dusk, and throughout the early part of the night, sometimes for minutes at a time, without any perceptible intermission, and one can then easily decoy these birds by imitating this call."

They are said to sing also occasionally during the day, but I never heard one at such a time, even during cloudy weather. As the breeding season advances they become more and more silent, but they sometimes sing as late as September, never with the vim and persistency, however, as on their arrival, when frequently half a dozen or more of these birds may be heard at the same time, forming a perfect chorus, their notes blending so completely into each other that they sound like a continuous "whipper-whipper-whipper," the last syllable being entirely lost in the medley of noise produced; still such vocal concerts are not entirely unpleasant to the ear, and rather lull the listener into a sound sleep.

About dusk the Whip-poor-will emerges from its hiding place in some neighboring thicket and goes hawking for its evening meal. A considerable portion of its food is picked from the ground, especially on well-travelled roads, on which it frequently indulges in a dust bath to rid its body of vermin. It will visit some favorite spots regularly, and slightly sandy roads are preferred to heavier soil. Its movements on the ground are rather awkward, its feet being weak and short; but few of our birds are more graceful on the wing than the Whip-poor-will. I have seen one touch the back of its wings together as it swept by me, arrest its noiseless flight instantly, drop to the ground almost perpendicularly, pick up some insect, and dash away as suddenly as it halted. At such times it occasionally utters a low, purring or grunting noise like "dack-dack," and another sounding like "zue-see, zue-see," which can not be heard unless one is close by."

Owing to the nocturnal habits of this bird and its custom of feeding upon very large moths and other insects, it is one of especial economic importance. Its appetite is in keeping with the size of its mouth, and it devours great numbers of the largest nocturnal insects, which are mostly moths, the young of which are plant-eating larvæ. Chapman states that a peculiar note is uttered only while resting, and that for about two hours after sunset and before sunrise, but upon one occasion during the last of May in Centre county we heard it frequently throughout the entire night, and we have heard it and also had it reported to us by others who have also heard it calling during a cloudy day.

We have not had opportunity to make very extensive examination of the food and stomach contents of this bird, but the few that we have examined have contained only insects, which were almost exclusively of the obnoxious species. In the Massachusetts Report for 1900 Prof. Forbush writes: "When the mature insects, gaining wings, attempt to escape by flight, they are snapped up by the Fly Catchers, which sit waiting on the outer limbs of the trees, or escaping these they are pursued by the Swallows and Swifts in the upper air. Those whose flight is nocturnal must run the gauntlet of the Screech Owl, the Night Hawk and the Whip-poor-will."

In "The Birds of Nebraska," Prof. Bruner has said: "Birds like the Whip-poor-will, Night Hawk and Chimney Swift, eat nothing but insects, such as they catch in the air while flying about. The first two are night-flyers, while the other is one of our birds that flies and feeds during the daytime."

Of the Whip-poor-will Bailey has written: "Its food consists of large insects which it procures on the wing."

In writing of the Goatsuckers, Night Hawks and Whip-poor-wills, Chapman has said in his "Bird Life:" "These birds feed at night upon insects which they catch upon the wing, and their enormous gape is obviously of great assistance in this mode of feeding. Often the sides of the mouth are beset with long bristles, which act like wings to a fish net, steering unfortunate insects down the bird's enormous throat."

Studer has said of the Whip-poor-will: "Its food is large moths, beetles, grasshoppers, ants, and such insects as frequent the bark of decaying timber."

Prof. Forbush, the Ornithologist of the Massachusetts State Board of Agriculture: "Observed it feeding on moths of the Tent-caterpillar, Canker Worm and Tussock Moth."—(Mass. Crop Report, July, 1900.)

In writing of the general feeding habits of birds, Prof. Bruner, of Nebraska has rightly said: "In the air Swallows and Swifts are

coursing rapidly to and fro, ever in pursuit of insects which constitute their sole food. When they retire the Night Hawk and Whip-poor-will take up the chase, catching moths and other nocturnal insects which would escape the day-flying birds."

The well known ornithologist, Frank M. Chapman, of the American Museum of Natural History, has written of the Whip-poor-will and Night Hawk in a recent Report of the Indiana Commissioner of Fisheries and Game as follows: "Both the Night Hawk and Whip-poor-will feed exclusively on insects, and feeding at dusk and by night when other birds are sleeping, they do usually good service by devouring species which might otherwise escape.

"Nighthawk.—The food of the Nighthawk consists of moths, beetles, including June bugs, ants, grasshoppers, flies, mosquitoes, and crickets. Mrs. Bailey mentions one bird of this species, the stomach of which contained 573 winged ants, parts of 72 small ants, and 16 grasshoppers. In the south where the Nighthawk is known as a Bull-bat it is often shot for so-called sport in large numbers, though the facts show that no bird is more deserving of protection.

"Whip-poor-will.—The Whip-poor-will feeds nearer the ground than the Nighthawk and is more often seen than heard. It eats ants, grasshoppers, potato beetles, June bugs, moths and other winged insects."

With this array of testimony in behalf of the modest whip-poor-will, we urge its absolute protection at all times and in all places. We have not been able to learn of any obnoxious feeding habits of this bird, and scout as absurd and superstitious a sentiment concerning its call which has led it to be described as "a solemn and prophetic cry." There is nothing more "prophetic" about the call of this bird than of any other, but the fact that it is nocturnal and lives in dark woods and flies, feeds and calls by night, is seriously against it among persons who are superstitiously inclined. It is also to be regretted that this little bird has been shot for food or as a game bird. Its feathers are so loose and fluffy that its real fleshy body is much smaller than would appear from the feathered and flying creatures of the atmosphere.

A similar bird is found in the western United States and called the Poor Will. Of this Bendire says: "The food of the Poor Will consists mainly of the smaller night-flying moths, beetles, locusts, etc., of which a considerable proportion are gathered from the ground. Its flight is swift, easy, and perfectly noiseless as it skims along close to the ground in search for suitable morsels, and of these the more indigestible parts, such as the wing coverts of beetles, etc., are ejected in the form of pellets, in the same manner as in the Raptores and other birds." It is probable that nearly

if not quite all species in the Order Macrochires eject from their stomachs pellets of indigestible portions of insects taken with their food, as has been described in discussing the owls in previous numbers of these Bulletins.

A. O. U. 420. THE NIGHTHAWK, BULL-BAT OR MOSQUITO HAWK.

Chordeiles virginianus (Gmelin). (Plate II.)

Over most of the cities of this country the Nighthawk wheels and soars during the later parts of summer afternoons and during the evenings. At such times it also utters its loud, shrill and unusual call "Peet-weet," and this is consequently one of the birds that is known at least by sight and sound to a great many people. Owing to the fact that almost whenever seen it is in the air, comparatively few persons form an acquaintance with it at close range. When seen at a distance it can be readily distinguished by the dark colors and the white spot in each wing, and when examined more closely it is to be recognized by the absence of bristles at the angles of the mouth, and the notch at the middle of the tail, as the middle tail feathers are shorter than those at each side of them. The Nighthawk is blackish with varied lighter marks as described below, but especially with the conspicuous wing spot, white bar across tail, and v-shaped light patch on the throat. While in the male these spots are conspicuously white, in the female they are tawny or obscure. It is slightly smaller than the Whippoorwill, being nine inches in length.

This bird is found in North America from New Brunswick to the Mackenzie river and westward to the Great Plains and south of this region. It is a strictly migratory bird, coming and going almost with the Whippoorwill and was first seen this year in the city of Harrisburg on May 1st. It spends its winter in South America and Central America as well as on the Bahama Islands. It is not a hawk by any means, and has none of the habits of a hawk, but its rather large size and nocturnal flight have been the cause of the application of this most familiar common name. It is also known as the Bull-bat owing to the roaring noise that it makes in the course of its downward flight, as described elsewhere.

"Back blackish, marked with whitish or cream; white bar on wings; tail blackish forked; broad white band on throat and white band on tail of male; under parts barred with black and white. Nests on ground. But few who have walked in fields and woods have not flushed this bird, resting conspicuously on ground of limb of a tree, and we are all familiar with its graceful evolutions in

the air during afternoon and evening, where its rather harsh cry at once draws our attention. Frequently a bird closes its wings and drops swiftly, again soaring upward just before reaching the ground. At such times one hears a booming sound, something similar to the noise made by blowing across the large mouth of a bottle. Just how this is produced appears to be a matter of question among ornithologists. Some claim it is made by the air rushing through the stiff wing feathers, called primaries. The food of the Nighthawk appears to be May flies, dragon flies, beetles, certain water insects which fly in the evening, many bugs and grasshoppers. From seven specimens secured in Nebraska Professor Aughey took three hundred and forty-eight Rocky Mountain Locusts (one of our most injurious insects). In an Arkansas specimen F. L. Harvey found more than six hundred insect-gnats, beetles, flies, ants and grasshoppers. Naturally a bird with habits like the Nighthawk would never injure fruit or berries. Some people confound the Nighthawk with the Whippoorwill, quite a different bird." (F. L. Washburn, State Entomologist, in Ninth Annual Report of the Minnesota Agricultural Experiment Station.)

"The Nighthawk is generally a common summer resident throughout the eastern United States north of latitude 35 degrees, while south of this it is more irregularly distributed, but breeds, to some extent at least, in all of our Southern States, excepting Florida and the immediate vicinity of the Gulf coast. Its common name is somewhat of a misnomer; it is by no means nocturnal in its habits; in fact, it is diurnal, and it is not at all unusual to see numbers of these birds on the wing on bright sunny days; but it does most of its hunting in cloudy weather and in the early mornings and evenings, retiring to rest soon after it becomes dark; but during bright moonlight nights it keeps up its flight somewhat later and I have heard its calls as late as eleven o'clock.

"It is one of our most graceful birds on the wing and its aerial evolutions are truly wonderful; one moment it may be seen soaring through space without any apparent movement of the wings, like that of our Falcons, and this is constantly more or less varied by numerous twistings and turnings. While suddenly darting here and there in pursuit of its prey I have seen one of these birds shoot almost perpendicularly upward with the swiftness of an arrow in pursuit of some insect. Its tail appears to assist it greatly in these zigzag changes, being partly expanded during most of its complicated movements. I know of no more interesting sight than to watch a number of Nighthawks while engaged in feeding, skimming close to the ground or over the water of some pond or lake, gliding swiftly along in all kinds of serpentine gyrations with the utmost grace

and ease, and no matter how limited the space may be and how numerous the birds, none will ever get in the way of each other; all their movements seem to be accomplished in the most harmonious manner.

"The Nighthawk is a social bird while on the wing, and I have seen fully a hundred at a time hawking over a small mountain meadow or pond, and they certainly seemed to enjoy each other's company. While on the wing their querulous and squeaky call note, sounding lake "æh-eek, æh-eek" or "speek-speek," is repeated at different intervals. Mr. W. E. Grover describes this note as a sharp, mowing "mueike," and it is also said to resemble the word "beard," uttered in a whisper. When disturbed while sitting on its eggs it usually utters a low, purring or chuckling sound; and during early spring the male frequently descends rapidly from high above, the vibration caused by the air passing through the primaries, producing a peculiar booming sound, which has been compared to that made by blowing through the bunghole of an empty barrel; this comes perhaps as near to it as it can be described. It is amazing to see what perfect control these birds have over themselves during this peculiar performance; descending as they do almost with the rapidity of a lightning flash, one would think they could not possibly arrest their downward course in time to prevent being dashed to the ground; but at the proper moment, by a single reverse movement of the wings, they rise in a gradual curve, to resume their flight or repeat the same performance. This aerial play seems to be principally confined to the mating and breeding season. I have never observed it later in the year.

"On the ground, however, the Nighthawk does not show to such good advantage, and its movements here are slow, unsteady, and evidently more or less laborious. Its food consists mainly of insects, such as flies and mosquitoes, small beetles, grasshoppers, crickets, and the smaller night-flying moths, and I believe they all are caught on the wing. It must be considered as an eminently useful and beneficial bird and deserves the fullest protection. Unfortunately, however, the Nighthawk is considered as a legitimate game bird in certain sections, and many are killed yearly for food, as well as for sport, simply to show the gunner's skill in marksmanship; and the good they do through the destruction of millions of troublesome insects is entirely lost sight of. Its favorite haunts are the edges of forests and clearings, burnt tracts, meadow lands along river bottoms, and cultivated fields, as well as the flat mansard roofs in many of our larger cities, to which it is undoubtedly attracted by the large amount of food readily obtainable in such localities, especially about electric lights, and also the secure and

convenient nesting sites afforded on the gravel-covered surfaces of the roofs, which may be found everywhere in abundance. During the heat of the day the Nighthawk may be found resting on horizontal limbs of trees, on fence rails, the flat surface of some lichen-covered rock, on stone walls, old logs, chimney tops, and on railroad tracks. When perched on the limb of a tree, a log, or a fence rail, it always sits lengthwise, and excepting during the mating season I have rarely seen one on the ground.

"Strictly speaking, the Nighthawk is not a forest bird, as it only frequents their outskirts, or extensive clearings and burnt tracts, while it avoids the denser and heavier growth of timber. It does not object to sunshine like the Whip-poor-will and the Chuck-will's-widow, and apparently is not affected by the light in the way they are.

"Like the rest of the Caprimulgidæ, the Nighthawk makes no nest, but deposits its two eggs on the bare ground, frequently in very exposed situations, sometimes on some little elevation, or in slight depressions on flat rocks, between the rows in corn or potato fields, in pastures, on gravel bars, and cinder piles near furnaces, and within recent years they also nest more and more frequently on the flat, gravel-covered roofs of houses in large cities. They undoubtedly find such nesting sites very convenient and secure, but the intense heat to which the eggs and young are necessarily exposed during the day must be something fearful, and I have no doubt that some of the latter perish, and that not a few of the eggs become addled, from this cause. In favorite localities the Nighthawk breeds occasionally in small colonies, and several pairs may be found breeding in close proximity to each other. I believe, as a rule, only a single brood is raised in a season, but if the first set of eggs is taken, a second one will be laid about a week after, which consists occasionally of only a single egg." (By Major Bendire, in his "Life Histories of North American Birds,"—Smithsonian Contributions.)

Mr. Frank M. Chapman, in his "List of Birds Observed at Gainesville, Florida," speaking of this sub-species, states: "Bull-bat or (as it is more commonly termed 'Bat' shooting is here a popular pastime, great numbers being killed for food, and in August, when the birds have gathered in flocks, favorite fields may be occupied at nightfall by as many as a dozen gunners."—The Auk, Vol. V, 1888, pl. 86.

"The Goatsucker, in common with almost all other nocturnal creatures, enters extensively into the superstitions and folk-lore of mankind. This is probably because these beneficial birds fly and feed at the time when 'spirits' are supposed to take wings or to enter into those things that have wings.

PLATE I.—Whip-poor-will. Male. Antrostomus vociferus. Mounted and photographed by E. W. Campbell, Taxidermist, Pittston, Pa.

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PLATE I.—Whip-poor-will. Male. Antrostomus vociferus. Mounted and photographed by E. W. Campbell, Taxidermist, Pittston, Pa.

INTENTIONAL SECOND EXPOSURE

PLATE II. NIGHTHAWK, BULL-BAT, OR MOSQUITO HAWK.

Order—*Macrochires*. Family—*Caprimulgidæ*. Genus—*Chordeiles*.
Species—*Chordeiles virginianus*.

Description:—Nighthawk (C. virginianus). Males—Entire upper portions black, mottled with gray and buff, white throat patch bordered by black on breast, rest of under parts barred with black and white; tail, dark wood-brown or blackish, crossed near tip with broad white band, except on middle feathers. The distinguishing mark is the conspicuous white band on the primary feathers of the wing; bill very small with wide gape; feet very small and weak; length of bird from tip of bill to end of tail, 9½ to 10 inches. Female—Like male, with less or no white on tail.

Distribution:—The Nighthawk is found throughout eastern North America from the Gulf States to 59 degrees north lat., east of the Plains, and northwesterly to 65 degrees north lat., also irregularly to British Columbia, Washington, Oregon and northern California in wooded districts.

Eggs—Two, creamery or grayish white, profusely speckled with blackish, brownish-gray or lavender; always laid on bare ground or a flat rock in an exposed situation.

W. D.

(From Educational Leaflet No. 1 of the National Committee of Audubon Societies. Loaned by Dr. Wm. Dutcher, New York.)

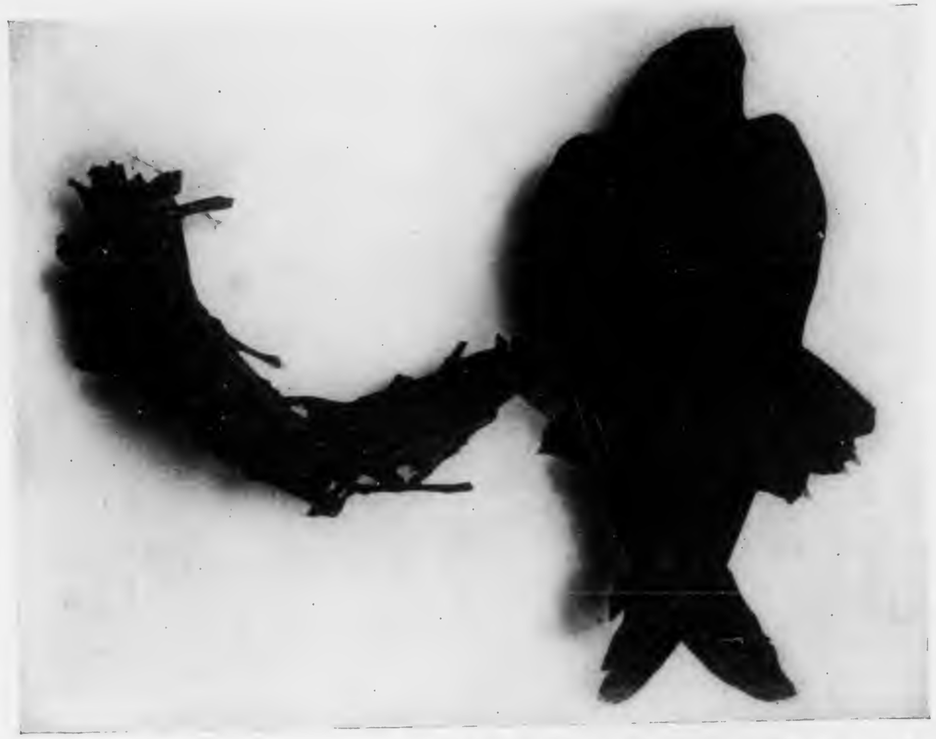

PLATE III. The Chimney Swift and Nest. Chætura pelagica. Photographed from a living specimen in the office of the Economic Zoologist.

PLATE IV.—Humming-bird on Nest. Trochilus colubris. About half natural size. From American Ornithology, Worcester, Mass. Kindly loaned by Chas. K. Reed, Editor

PLATE V.—Fig. 1. Humming-bird, natural size. Photograph, by the Economic Zoologist, of a mounted specimen in the Museum of The Pennsylvania State College.

PLATE V.—Fig. 2. Nest and eggs of humming-bird, natural size. From American Ornithology, Worcester, Mass. Kindly loaned by Chas. K. Reed, Editor. (Photo by J. H. Miller.)

PLATE VI. Fig. 1. Young Chimney Swifts, with Female Parent clinging to inside of a barn. From a photograph by Mr. Guy A. Bailey, of Syracuse, N. Y., illustrating an article in *Bird Lore*. Kindly loaned by Mr. Frank Chapman, Editor, New York.

PLATE VI. Fig. 2. Old Chimney Swift crowding young out of nest and making them learn to cling to the wall. From a photograph by Mr. Guy A. Bailey, Syracuse, N. Y., illustrating an article in *Bird Lore*. Kindly loaned by Mr. Frank Chapman, Editor, New York.

Thus the very name that the bird to-day bears is the relic of a popular belief begotten in the darkness of ignorance and superstition which should be dispelled by the light of modern science. It has been handed down through many generations that these large-mouthed nocturnal birds subsist by milking cows and goats. Nothing could be more absurd.

"'Poor injured little bird of night,' says Waterton, 'how sadly hast thou suffered, and how foul a stain has inattention to facts put upon thy character. Thou hast never robbed man of any part of his property, nor deprived the kid of a drop of milk.' When the moon shines bright you may have a fair opportunity of examining the Goatsucker. You will see it close by the cows, goats, and sheep, jumping up every now and then under their bellies. Approach a little nearer. See how the nocturnal flies are tormenting the herd, and with what dexterity he springs up and catches them as fast as they alight on the bellies, legs, and udders of the animals. Were you to dissect him and inspect his stomach, you would find no milk there. It is full of flies which have been annoying the herd." (Henry Nehrling, in "*Our Native Birds of Song and Beauty.*")

"The American Silkworm, the larva of the *Telea polyphemus*, is one of the largest and most voracious of our caterpillars, and should it increase as rapidly as the Gypsy moth it would become a fearful pest, but it is noticeable that this and other allied species of this size never reach a destructive height. The principal reason for this scarcity is that they are eagerly eaten by birds. Hawks, owls, goatsuckers, or nighthawks, woodpeckers, jays, robins, tanagers, blackbirds and other species capture these large caterpillars." (Prof. Forbush in the Mass. Crop Report of 1900.)

"The Nighthawk is a harmless bird, and should never be shot. It is known to eat quantities of mosquitoes, and that should be enough to recommend it." (Report of the New Jersey State Board of Agriculture for 1903.)

"The Nighthawk destroys insects in large numbers." (Samuel, in "Our Northern and Eastern Birds.")

"The Nighthawks are commonly seen toward evening in pairs sailing around in sweeping circles high in the air, and occasionally descending lower to capture flying insects, chiefly of the larger kind, such as wasps, beetles and moths." (Studer.)

"Its food consists mainly of insects, such as flies and mosquitoes, small beetles, grasshoppers, and the small night-flying moths, all of which are caught on the wing. As a useful bird it deserves the fullest protection." ("Birds," Jan., 1897.)

"In feeding habits it is entirely insectivorous, catching its prey while on the wing. So entirely insectivorous is it that instances are

known where it starved and died in time of scarcity of insects." (Bulletin No. 94, Mich. Agric. Experiment Sta.)

We see from the above quotations and from our own studies that the food of the Nighthawk is almost exactly the same as that of the Whip-poor-will, being insects, mostly of the larger nocturnal species, which in at least one of their stages of growth are quite destructive to vegetation. These birds are the chief enemies of such pests in their adult or winged form. The chief difference in the feeding habits of the Whip-poor-will and Nighthawk are that the former feeds mostly near woodlands and over thickets, while the latter feeds over open fields and gardens and to a very great extent over villages and cities.

It is becoming more abundant in the cities of our State than it has been in previous years for the reason that it finds safe nesting places upon the flat gravel-covered roofs of the larger buildings. Last summer one could be seen during the greater portion of the day, resting upon the roof of a building adjoining our office. It has been said that they call only when flying and always perch lengthwise upon the branch, rail or log upon which they rest. However, exceptions must be made to both these statements, as on the evening of the 5th of June this year we heard one calling several times from a tree top in the Capitol Park, Harrisburg, and plainly saw it resting crosswise on a limb about the size of a man's arm. This fact was pointed out to witnesses as not being in accordance with the popular published statements concerning this bird.

An interesting fact in the structure of the Nighthawk is that while it retains the pectinate or comb-like claw on the middle toe of each foot in common with all other species of its family, it has almost or entirely lost the rictal bristles or sharp, strong bristles from the corners of the mouth, such as are possessed by the Whip-poor-will. This shows that in the Nighthawk the toothed claw is a vestige or remnant of a former condition and habit and expresses relationship but no present utility. In this regard it is to be classed with the scars on the inside of the front leg of a horse, the vermiform appendix and scalp muscles of mankind and numerous other vestiges to be found in almost every species of organism.

It appears that the greatest foe of these decidedly beneficial birds is the gunner, especially in southern states, who persists in trying his skill upon them regardless of the loss to trees and crops that comes from the promptly increasing horde of insects which every year are becoming more serious because their natural enemies are being thus destroyed. We have national laws regulating interstate affairs for the welfare of the citizens of our Nation as a whole. In our own Commonwealth the Nighthawk, Whip-poor-will and other beneficial birds are protected at all times, yet our loss by destructive insects is at least $25,000,000 annually and is increasing. In some of the southern states these birds are not protected at all, yet they fly freely from state to state in their course of migration, nesting here and wintering southward. There they feed also upon destructive insects of which no doubt the Cotton Moth or winged form of the Boll Worm must be an important feature of their prey. Prof. Marlatt, of the U. S. Department of Agriculture, Washington, has recently published the official statement, after very careful investigation, that the annual loss to the United States by destructive insects is at least seven hundred million dollars and this is increasing. Would it not be wise—yea, is it not imperative—that our National legislators take measures toward giving universal protection to such important beneficial birds?

REMARKS ON ECONOMIC VALUE OF NIGHTHAWKS.

(From Educational Leaflet No. 1, of the National Committee of Audubon Societies.)

BY F. E. L. BEAL, Economic Ornithologist, United States Department of Agriculture.

The Nighthawk, or Bull-bat (Chordeiles virginianus), is a bird which neither attracts attention by the beauty of its plumage nor the sweetness of its song. It is most often seen soaring high in air in the afternoon or early evening, and at such times utters its only note, a sound much resembling the "scaip" of the woodcock. When at rest it is usually seen on a bare limb of a tree, or the rail of a fence, where it sits with its body lengthwise of the perch, instead of crosswise as is generally the case with other birds. It does not attach itself to the abodes of man and render itself agreeable by its sprightly manners and pleasing companionship, but holds itself aloof from the works of civilization, and at nesting time brings forth its young upon rocks and bare knolls remote from human dwellings. To this there is one remarkable exception. In large cities, where most of the buildings are high, with flat roofs, often covered with gravel, the house-tops are as free from human intrusion as the top of a mountain, and the nighthawks take advantage of this artificial desert to lay their eggs and rear their young safe from man who crawls about in the crevices of streets far below.

The body of the nighthawk is much smaller than one would suppose from seeing the bird upon the wing. The long wings and the loose, fluffy feathers, tend to give an exaggerated appearance of size that is not real. The body is actually so small, and with so little flesh on the loose skeleton, that it is about the last bird one would suppose thaat anyone would kill for food. The pectoral muscles which move the long wings constitute the principal and only part where there is much flesh. The legs are small and weak and do not appear to have much use, so that the muscles which move them are reduced to a minimum.

In one point, however, the nighthawk's anatomy is fully developed; its stomach is huge for so small a bird. In capacity it fully equals, if it does not exceed, that of the common pigeon, whose body is at least twice as large. It is right here that the nighthawk's usefulness appears. This enormous stomach must be kept filled to supply motive power for the long wings which are kept in motion so many hours. To facilitate this work, Nature has given the bird an immense mouth, which is really more like the mouth of a turtle or frog than of a bird. The food consists of insects taken on the wing, and so greedy is the bird that when food is plenty it fills its great stomach almost to bursting. To ascertain the character of the food taken, nearly one hundred stomachs were examined, with interesting results. One of the most conspicuous elements was flying ants. Remains were found in 36 stomachs, in 24 of which the number ranged from 200 to 1,800.

While ants have at times a useful function, they are for the most part annoying and harmful insects, and it is evident that they would be much more numerous than they are were not their ranks so severely thinned by the attacks of the nighthawks. Moreover, these ants are killed at the most important epoch of their lives. when they are preparing to propagate their kind, when the death of every female means the loss of hundreds, or perhaps thousands of the next generation. In this work nighthawks rank next to, or even with, the woodpeckers, the acknowledged ant-eaters among birds. Grasshoppers are another important article of the Nighthawk's diet. One stomach contained the remains of 60 individuals, probably the refuse of several meals, as the jaws of the insects were the principal remains. Another stomach contained 38, another 22, and still another, 19. These last were mostly entire, and serve to show how much the stomach of a nightawk can hold. Many other stomachs contained smaller numbers of these insects. May-beetles (Lachnosterna) were found in a number of stomachs. One held the remains of 34, another 23, and a third, 17. Several other stomachs contained less numbers. Besides these, many other injurious or annoying in-

sects were found, but mostly in smaller quantities. One bird had eaten three Colorado potato-beetles; several had taken both the striped and spotted squash beetles. Many other less known but injurious beetles were found, one stomach containing no less than 17 different species.

Bugs, of the Chinch bug family, were found in very considerable numbers, though that pest itself was not observed. Leafhoppers were also eaten in considerable numbers. Many stomachs were nearly filled with some soft-bodied, dipterous insects, allied to mosquitoes, but not further identified.

From these glimpses of the nighthawk's food habits, it must be evident that it is one of our most useful birds. Not only does it do a great amount of positive good by the destruction of enormous numbers of insects, but it is to be commended for its negative qualities, in that it not only does not destroy any of the farmer's crops, but does not even visit them or use them for nesting sites. It never touches grain or fruit; it never troubles the garden, and in the orchard it only occasionally perches upon the branch of an apple tree. It does not even ask a blade of grass with which to build its nest, for it makes no nest. It does not injure the grass by laying its eggs thereon, for its eggs are laid upon bare earth or on a rock. It does not molest poultry nor the nests of other birds. Indeed, where can we look to find a bird whose direct contact with man and his works is so slight? When we consider that this bird renders such a signal service to man, and asks nothing and takes nothing in return, it seems as if it should have every protection that can be afforded. Its body at best yields but a morsel of food when killed, and when we think of the worth of its services while living, we are impressed with the belief that the economy of using its body for food is much like that involved in cutting off the tops of a pair of boots in order to make a pair of shoes. In some parts of the country the Nighthawk is not only killed for food, but is used as a target for gun practice on the wing, under the impression that it is a bird whose killing can do no harm. How erroneous this is we have already shown. When we consider that during many hours of the evening, and often all day, these birds sweep the air with their great drag-nets of mouths, we do not wonder at the enormous numbers of insects which they capture. The 87 stomachs examined were estimated to contain not less than 20,000 ants alone, and this was not half of the insect contents.

In view of these facts, we hope that the practice of killing this bird, whether for food or for sport, will be wholly given up. It is a practice which at best affords poor returns of either, and which entails an almost incalculable injury upon the agricultural interest.

FAMILY 21. MICROPODIDÆ. THE SWIFTS.

The birds of this Family have the same general structural characters as those in other families belonging to the higher group or order of Macrochires. However, they are distinguished by the very small bill, wide mouth or gape (fissorostral), middle toe not much longer than others and its claw not toothed, rictal bristles absent, plumage quite firm or compact and dark in color, feet very small and weak and hind toe elevated and small.

There are about seventy-five species of Swifts known in the world of which about one-half are American, four are North American and only one is Pennsylvanian.

A. O. U. No. 423. THE CHIMNEY SWIFT.

Chætura pelagica (Linnæus.) (Plate III.)

The genus Chætura, to which are Chimney Swifts, or so-called "Chimney Swallow" belongs, contains those species of this family which have the tail rounded and its feathers with sharp, spiny shafts projecting beyond the plumage. It comes from the Greek and means "bristle tail." Our common and familiar Chimney Swift is to be known by its dark plumage, with grayish on the throat and sooty black spot before the eye, shafts of tail feathers extending like needles beyond the plumage and the trembling bat-like flight as the birds sail through the air. The length of the Swift is five and one-fourth inches, of its wing about five inches and its tail two inches. It is our only bird with rapid, trembling, irregular flight and small size that is entirely dark beneath. In its flight and actions and in fact in its eating habits it often closely resembles the bats. It is found throughout eastern North America, breeding from Florida to Labrador and wintering in Central America, being thus only a summer resident in the State of Pennsylvania. It generally comes into our State during the latter half of April and leaves during the latter part of September. This year it arrived in great numbers at State College, Centre county, Pa., on April 22d, and from the excited wheeling and twittering exhibited by the members of the large flock they were apparently glad to be back at their old tall chimney through which they had first looked up to see the light of day.

Formerly Chimney Swifts nested in hollow trees, caves and crevices of rocks. At the present time, owing to the general destruction

of the large, hollow trees which would afford them nesting places and the erection of chimneys which give them needed protection they have almost universally changed their nesting habits to these more modern structures of mankind. However, it appears from the number that have comparatively recently been observed in the gable ends of barns and similar buildings, that the Swift is again changing its nesting habits from chimneys to barns and other buildings where it finds suitable situations. A great many nest in one chimney and the noise which they often make in entering or leaving it is to be compared to the roar of thunder.

In its pelagic or openly flying habit and in some features of its general appearance it resembles the Swallow, but in details of structure or anatomy it is more closely related to the Hummingbirds and Nighthawks, and not being a Swallow is thus wrongly called "The Chimney Swallow."

The nesting habits of the Chimney Swift have been so accurately observed and carefully described in the correspondence of Mr. Otto Widman, with Captain Bendire, published in "*The Life Histories of North American Birds*" that we here quote:

"Only a small quantity of glue is secreted daily, and therefore the completion of the entire structure requires about eighteen days. After two-thirds of the nest is completed (the work of one week) the laying of eggs begins. The process of construction may be retarded by cool wether (lack of food) and by continued rains (softening of glue). The bird can control the laying of eggs; can discontinue for one or more days, if she thinks necessary. Incubation begins before the last egg is laid and lasts eighteen days. The setting parent shields the structure by habitually covering its base with the breast and pressing the head against the wall above. After the young are eight days old they arrange themselves in the same manner. When the sitting bird is disturbed, it at first seeks to frighten the intruder by fluttering and then hides below the nest. The young, when a forthnight old, also hide under the nest, where they can not be seen from above. When three weeks old, they flutter and try to frighten the intruder with a hissing noise, and always remain 2 to 3 feet below the mouth of the chimney (shaft) where they are fed by the parents. The young do not leave the chimney before they are four weeks old. Under the most favorable conditions a late brood can not be brought to a successful end in less than fifty-eight (five eggs) to sixty (six eggs) days, while an early brood (begun the middle of May) may consume from sixty-five to seventy days."

"The male assists in incubation. I saw one of these birds fly in the loft while I was there, hook himself to the board below the nest, and shortly afterwards he uttered a low twitter; the one on the nest

left at once on hearing the note, and flew out, while the newcomer perched on the rim of the nest and rearranged the eggs first before covering them. It changed its position twice before it seemed suited; at least one-half of its length projected outside of the nest, and it is certainly puzzling to know how they manage to rear a family of four or five young in so small a space.

"The amount of saliva used to glue them together also varies greatly in different specimens; in some this is very plainly perceptible, and occasionally forms a thing coating on the inside of the nest; in others hardly a trace can be seen, but nevertheless the twigs hold together. There is no inner lining of any kind used, the eggs lying on the bare twigs. The latter are gathered on the wing, the bird breaking them off with its beak while flying past. Before the country was well settled the Chimney Swift built in hollow trees, attaching its nest to the inside walls, and in sparsely settled regions it does so still to some extent; but now, wherever they can avail themselves of an unused chimney, no matter of what material it is constructed, they do so, both for nesting and roosting purposes. It seems to me that they are gradually changing again more and more from the chimney to the inside of barns and outhouses, attaching their nests to the sides of rough, unplaned boards, near the roof. Such sites are more protected from storms, and certainly much cleaner, and the birds appear to have found this out, and act accordingly.

"Few birds are more devoted to their young than the Chimney Swift, and instances have been recorded where the parent was seen to enter chimneys in burning houses, even after the entire roof was a mass of flames, preferring to perish with its offspring rather than to forsake them. I have seen in 'Forest and Stream' (September 15, 1894, p. 223), another most remarkable proof of affection for their young; want of space prevents me from quoting it entire. The writer states that fully a month after the Chimney Swifts had departed on their southern migration he heard a familiar twitter in the chimney, and taking out the old-fashioned fireboard found a full-grown bird lying upon the hearth. Looking more closely, he discovered that it was fastened by a horsehair wrapped around its leg to the nest, which had fallen down with it. He says: 'His anxious mother, who had cast in her lot with him, to remain and to die with him, for the time of insects was about gone, came into the chimney and actually waited beside me while I snipped the strong hair and released him. It was an hour or more before he gained the use of his legs and learned what his mother was teaching him by flying up and down in the chimney, and then they both started on their lonesome flight to the far south.' This instance certainly

shows a tender side of bird nature, and such instances are far more common than they appear to be, if we could only see them. The young are fed by regurgitation."

The nest is made entirely of small dead twigs glued together in the shape of a half round basket and cemented to the side of the chimney like a bracket. No other material whatever besides the dead twig and the dried glue or saliva are used in the construction of these nests. The edible birds' nest of China is made by another species of Swifts and is constructed entirely of the glue—sticks and other nesting material not being used. We have seen Chimney Swifts flying around the top of a dead oak tree, gathering the small twigs for their nests by striking them in their flight, breaking them off and carrying them away in their small feet without ever stopping in the course of their flight. This is accurately illustrated by Mr. L. A. Fuertes on Plate 45 of "Bird Craft," by Mabel Osgood Wright. The eggs are from four to six in number, pure white, and eight-tenths inch long by five-tenths inch wide.

The young live in the nest until they are large enough to cling to the sides of the chimney where they soon learn the use of their short bristly tail feathers and sharp and strong but small claws in supporting themselves and clinging to a vertical wall. The bristle-pointed tail is a very important organ in enabling the adult bird to cling and rest on the vertical surface. The young birds are fed entirely upon insects of various kinds which are captured by their parents in flight and are generally regurgitated, or thrown up from the crop of the parent, although live insects have been seen trying to escape from the mouth of the young Swift and this would indicate that sometimes the food is carried only in the mouth of the parent. Unfortunately through superstition, ignorance and cruelty manifest in other forms these birds are often shot and many persons appear to think that the young will be fed by other birds which nest in the same chimney. This is not true of any kind of bird whatever, as during the nesting season old birds have enough to do to take care of the inhabitants of their own nest. When the young leaves the nest and the chimney for their first flight there is great commotion and apparent rejoicing on the part of the entire colony. This is indicated by the nervous flight and twittering exhibited by all members of the flock.

The adult birds feed entirely upon insects which they catch while flying, and which are generally the smaller day-flying insects of species that are likely to become very abundant and consequently very destructive. As a destroyer of small diurnal or day-flying insects which move in the upper atmosphere there is no bird of greater value. It is interesting to see what other authors have written about them.

In "Our Northern and Eastern Birds" Samuels says: "From earliest dawn until seven or eight o'clock in the morning the Swift is busy in pursuit of insects; it then retires to its roosting places in the chimneys, and is seldom seen until late afternoon. From early twilight until late at night it is again actively employed; and we have heard its note, as it sped through the air, often as late as midnight. I have no doubt that, in pleasant weather it is busy through the whole night."

"The little Chimney Swift and Nighthawk are birds of wonderful power and usefulness in keeping the air clear of insect pests. Both have applied for homes in our cities and should be most carefully protected. The Nighthawks nest on the flat roofs of buildings, and the Swifts in unused chimneys. The Swifts nest in colonies in the same chimneys and are often killed in great numbers by starting fires during cold weather in early summer. Great care should be exercised to avoid this whenever possible." (From Nature Leaflets of Clark University.)

"The Chimney Swift feeds on Tent-caterpillars, Tussock Moths and Aphids." (Prof. Forbush in the Mass. Crop Report for 1900.)

"The Chimney Swift feeds on insects which it captures on the wing and like some of the preceding families it disgorges the undigestible portions of its food." (DeKay in "The Natural History of New York.")

"This bird is entirely insectivorous and seems to feed wholly while on the wing, and to be more active by night than during the day." (Mich. Bulletin No. 94.)

We have found small insects of various kinds in the stomachs of these birds, and among them have been gnats, small flies, mosquitoes, and beetles of various kinds, especially small and destructive weevils. One, which was found dead on the campus of the Pennsylvania State College, and handed to us, contained over half a hundred specimens of the adult or winged form of the Clover-leaf Weevil (Phytonomus), which is recently becoming so destructive to the clover crop of this State. Another specimen of Chimney Swift found on the Cornell Campus and examined by the writer contained the sting of a bee at the base of the tongue beside the opening of the trachea or windpipe which had been closed by swelling caused by the sting, and which had evidently produced death by suffocation while the Swift was flying, when it had been so unfortunate as to capture a honey bee. It is rarely indeed that these birds feed upon beneficial insects, but for the sake of truth such facts should be reported when they are known.

Chimney Swifts are not destructive in their feeding habits nor obnoxious in any way unless it be on account of the noise which they

sometimes make in unused chimneys. Where they really become troublesome in this way they can be kept out of chimneys by fastening a wire netting over the top, but this should be done before the eggs hatch in order to avoid the cruelty of starving the young. In most places the noise in the chimneys is not of sufficient importance to justify this opposition to them.

A popular writer has said that the Chimney Swift is obnoxious because "the presence of the nests often inroduces bedbugs, as they are to a certain extent parasites of these birds." While wishing to avoid the appearance of rudeness we find it necessary to make the emphatic statement that this is not true. Chimney Swifts, Barn Swallows and other birds and bats do not carry bedbugs and infest residences with these pests as indicated above and as is too often believed. This is a gross injustice to our most useful creatures, and is the outcome of superstition and ignorance possibly based upon the very slight knowledge that these creatures may sometimes be infested with such parasites. The parasites, however, are not bedbugs, nor are they pests that will afflict mankind. There is no justification in persecuting such birds as Swifts and Swallows as the result of such mistaken notions. This bird is rightly protected by law at all times of the year.

FAMILY 22. TROCHILIDÆ. THE HUMMINGBIRDS.

While the birds of this Family belong to the Order Macrochires and have some general structures in common with those of the preceding two Families they are placed in the Family Trochilidæ by virtue of the long awl-shaped or tenuirostral bill, extensal tongue, six secondary feathers and compact metal lustrous plumage. They are all small and brilliantly colored birds of which more than three hundred species are known, all of which are American. In fact no Hummingbirds are known from any other part of the world than America. Seventeen species are found in the United States, but only one occurs east of the Mississippi or in the State of Pennsylvania. This is called the Ruby-throated Hummingbird, and belongs to the genus Prochilus, which is the Greek for "a plover."

A. O. U. No. 428. The Ruby-throated Hummingbird.

Trochilus colubris (Linnæus).

This smallest and most brilliant of all our species of birds is too well known to need description. The common name is given on account of the ruby throat of the male. These birds are metallic

green above with the tail deeply forked, purplish and with narrow feathers. The female is without the red on the throat as in the male. The young are similar in color to the female but have the upper part more bronzy. The total length of this bird is three and one-fourth inches, while the wing is one and two-third inches in length and the tail one and one-fourth. The Hummingbird is one of the very prominent and well known birds of Pennsylvania seen frequently during the day and evening flitting around tubular flowers and extracting their sweets and small insects. It is so fearless that it readily approaches flowers within a few feet of observers and thus is much more often seen and better known than are many lrager but more shy species of birds. It is a summer resident coming into our State about the last of April and leaving us about the last of September. It is found throughout eastern North America nesting from Labrador to Florida and wintering from southern Florida to Central America. Where there are honeysuckles, morning glorias, begonias, nasturtias, and other tubular cultivated flowers, they may often be seen in gardens. Among the wild or uncultivated flowers the wild touch-me-not or jewel weed (*Impatiens*) is one of its favorite plants and it can generally be seen where these are abundant.

The nest of these birds is not larger than a hulled walnut and is generally made to represent a knot on the branch of a tree. It is composed of soft and delicate plant down and covered with gray lichens or moss which make it resemble the bark of the tree upon which it is placed. (See Fig. 2, Plate V.) It is generally placed fifteen to twenty-five feet from the ground, but is not often seen because it is so inconspicuous in both color and size as it rests like a knot upon the thick portion of the limb. The Hummingbird has no other note than a shrill mouse-like squeak, yet the presence of its nest is often indicated by the frequent vertical descent of the birds as they come to it from above. In this descent the humming or whirring sound of their wings betrays their presence and often their nest.

The eggs are two in number and pure white, agreeing in number and color with those of all other species of Hummingbirds that have been seen. They are, of course, the most minute eggs of birds found in this country, being but one-half inch in length and one-third inch in diameter.

The young are fed by regurgitation or by food which is predigested by the parent and brought up from the stomach for the purpose of feeding its offspring. The long sharp bill of the parent is inserted into the open mouth of the young and pushed down the throat to such a distance and with such violence that one beholding the process

would shudder in expectation of seeing the most minute of baby birds speared to death by the provident parent.

"The Ruby-throat needs no song, its beauty gives it distinction and its wings give music. Its only note is a squeak, expressive of distress or excitement. It has no rival in eastern North America, and is to be found confounded with nothing but the Sphinx "Hummingbird Moths." One hears of "Hummingbirds" seen in the evening about flower beds. This mistake is not unnatural, and a correction is sometimes received with incredulity. The birds spend but a comparatively small part of the time upon the wing. Whoever watches the female busy about her nest will see her constantly perching here and there in certain branches of the tree, preening her plumage and looking about her. The male, at the same season, forgetful to all appearances of his conjugal and parental duties, may be found at home day after day on a dead twig in some small tree, where he sits so comfortably as to make the observer wonder what he can be about, and where, if ever, he takes his food. Further investigation, however, will show that he makes frequent and regular rounds of favorite feeding places. A tall blueberry bush, for example, will be visited at short intervals as long as the observer has patience to stand it. The Hummingbird is curiously fearless. Sometimes it will probe a flower held in the hand, and when they fly into houses, as they pretty often do, they manifest but the slightest degree of suspicion and will feed almost at once upon sugar held between the lips. The old bird feeds the young by regurgitation—a frightful looking act—the food consisting largely of minute insects. The young remain in the nest for some three weeks and on leaving it are at once at home on the wing." (Bradford Torrey.)

Of the Hummingbird some authors have written as follows:

"Its long delicate beak enters the cup of the flower, and the protruding double tongue, delicate, sensitive and imbued with glabrous saliva touches each insect in succession and draws it from its lurking place to be instantly swallowed. All this is done in a moment, and the bird, as it leaves the flower, sips so small a portion of its liquid honey that the theft, we may suppose, it but a benefit to the flower, which is thus relieved from the attacks of its destroyers." (Studer in "Birds of North America.")

"The food of the Hummingbird consists almost entirely of insects which are captured by protruding the tongue into flowers of various shapes without opening the bill very wide." (Samuels in "*Our Northern and Eastern Birds.*")

"When the late tulips and narcissi are blooming in the garden and you hear a tense humming near them, varied by an occasional squeak,

you know, without looking, that the Hummingbirds have come. All through late May they dart here and there, now through the flowers and then disappearing high up in the trees searching for honey and aphids with their proboscis like tongue, while their movements exceed in dash and rapidity even the Swallows and the Swifts." (Mrs. Wright in "Bird Craft.")

Of the Ruby-throated Hummingbird Captain Bendire writes:

"It prefers rather open and cultivated country interspersed here and there with mixed or deciduous woods overrun with flowery masses of vines and creepers, extensive orchards, etc., and it is not at all adverse to taking up its home in flower gardens in close proximity to man. Its flight is extremely swift, and the rapid motions of its wings in passing back and forth from one cluster of flowers to another causes a humming or buzzing sound from which the members of this family derive their name of Hummingbird. Notwithstanding the very small size of most of our Hummers, they are all extremely pugnacious, especially the males, and are constantly quarreling and chasing each other, as well as other birds, some of which are many times larger than themselves. Mr. Manley Hardy writes me that he once saw a male Ruby-throat chasing a Robin out of his garden and following it up until lost to sight.

There appears to be considerable difference of opinion amnog various observers regarding the nature of the food, some contending that this consists principally of nectar sipped from flowers, as well as the sweet sap of certain trees, to which they help themselves at the drinking places of the Yellow-bellied Sapsucker, *Sphyrapicus varius*, while others, myself included, believe that they subsist mainly on minute insects and small spiders, the latter forming quite an important article of food with them. Mr. Edward E. Eames, of Bridgeport, Conn., mentions finding sixteen young spiders of uniform size in the throat of a young Hummingbird which was about three days old. That our Hummingbirds live to some extent on the sap of certain trees is undoubtedly true, but that they should exist for any length of time on such food alone is very questionable, to say the least? They are particularly fond of the sap of the Sugar Maple, and only slightly less so of that of different species of oak, birch, poplar, sycamore and willow, as well as of the nectar secreted in the flowers of the lilac, honeysuckle, jasmine, begonia, horse chestnut and others. The swamp thistle which blooms in August seems to have great attraction for the Ruby-throated Hummingbirds. I have seen more than a hundred birds about these plants in the course of an hour. Since it has been stated that the bee gets pollen but not honey from the thistle, it would appear that these birds visit these

flowers for insects. There is scarcely a flower that contains so many minute insects as a thistle head. Examine one of the limbs and it will be found to contain many insects that can hardly be seen with the unaided eye, and if the Ruby-throat eats insects at all these are the ones that it would take; and because the larger ones remain the observer might conclude that none were eaten. The jewel weed (Impatiens) also receives much of their attention and nowhere do I find these birds so abundant as about these two flowers.

I could quote considerable more testimony showing that the Hummingbirds live to a great extent on minute spiders and insects, but consider it unnecessary. Hummingbirds are readily tamed and make interesting pets, but do not seem to live long in captivity. Something seems to be lacking, probably the required quantity of insects which they are able to obtain in a wild state and the syrup alone does not appear to enable them to survive such changed conditions for any length of time." (Captain Bendire in his "Life Histories of North American Birds," Smithsonian Contributions.)

We are fully convinced that the food of the Hummingbird consists mostly of minute insects and very small spiders together with nectar from flowers, sweet sap from trees or even fruit, which have been injured and from which the sap may be found exuding and also pollen from the flowers visited. Pollen grains are very highly nitrogenous and decidedly nourishing as is shown by the fact that bees gather them for "bee bread," which is packed in the cells beside honey for the food of themselves and their brood, and there is no reason why the Hummingbirds could not find considerable nourishment from the pollen grains which they must surely take in their visits to flowers.

We have found pollen grains of various kinds upon the feathers of the heads of Hummingbirds and are satisfied that in nature these birds perform a function that is chiefly given to insects in cross fertilization or carrying pollen from flower to flower.

Hummingbirds have been known to perish by becoming wedged so tightly into the corollas of large funnel-shaped or trumpet-shaped blossoms that they could not extract themselves and thus perish and have been found in this situation, which tells its own story.

In their feeding habits and economic effects these birds are wholly beneficial and are not known to possess one obnoxious feature, and therefore they should be protected in every possible way. They delight in a both and clean water should be provided for them and other birds for bathing during dry and hot weather. In placing poison such as strychnine in the large tubular flowers of certain plants like the blossoms of tobacco, jimson, morning glory, begonia, etc., for killing the hawk moths or sphinx moths which lay the eggs that produce the larvae of tobacco, tomato and potato worms and

also in placing poison for these latter pests care should be taken to not kill the Hummingbirds by such poison. This can be avoided by putting out the poison late in the evening after the Hummers have ceased eating, but just at the time when the Hawk moths or so-called Hummingbird Moths are most active and either removing or covering the poisoned flowers or cups during the daytime.

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